

An aerial photograph of a city, likely Hartford, Connecticut, showing a river (the Connecticut River) flowing through a densely wooded area. The city is built on a hillside, with a mix of residential and commercial buildings. A large bridge is visible crossing the river. The overall scene is lush with green trees and vegetation.

Urban Environmental Design Manual



The Urban Environmental Design Manual

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Rhode Island
Department of
Environmental
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John H. Chafee

BLACKSTONE RIVER VALLEY

National Heritage Corridor Commission





Dear Rhode Islander:

There is an increasing interest in redirecting development into our urban areas. This “smart growth” movement is not only good for the environment by taking development pressure off our farms and forests but makes good economic sense since it more efficiently takes advantage of the tremendous public investment in infrastructure and is restoring abandoned properties to the tax rolls. The revitalization of our urban neighborhoods also adds immeasurably to our quality of life. Although redevelopment of our urban communities is desirable, it may further impact natural systems that are already impaired. The purpose of the Urban Environmental Design Manual is to encourage environmentally sound urban revitalization and infill development by providing guidance to local officials and the development community to demonstrate how smart growth design principles can be integrated with environmental protection and restoration. There is a direct correlation between land use patterns, the way a site is developed and environmental degradation. Poorly planned growth has been well documented to have devastating impacts to natural, cultural and recreational resources. However, well-planned growth using flexible land use techniques with attention to good site design and development practices can prevent subsequent and restore existing impacts to the environment and community character. The manual offers alternative and cost effective techniques that can assist with the challenge of redeveloping urban sites.

Thanks to the financial support from Environmental Protection Agency and the John H. Chafee Blackstone River Valley National Heritage Corridor Commission, RIDEM in partnership with a broad based advisory committee obtained the professional services of nationally recognized planning, design and environmental management experts Dodson Associates and Horsley Witten Group to prepare this manual. The recommendations contained in this manual reflect the hard work and dedication of the consultants, as well as the advisory committee who volunteered their time to help make this project a success. We at RIDEM take great pride in being able to provide Rhode Island Communities the assistance they need to plan for growth while protecting, preserving and restoring the environment.

Sincerely,

Frederick J. Vincent
Acting Director

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Chapter 1 – Introduction to the Project and Principles of Urban Environmental Design

Introduction

The purpose of this manual is to show how “smart growth” design principles can be united with best management practices for stormwater to create communities that are more livable, more successful economically and more environmentally sustainable. This integration of ideas and techniques offers striking opportunities to turn difficult sites into growth centers that help revitalize surrounding neighborhoods. This approach offers immense advantages in allowing city officials, residents, and developers to work together to coordinate public and private investment, creating a synergy that produces the greatest potential benefit to all. By building more efficiently, learning from the past about how to make more livable communities and channeling the resulting savings into additional quality of life amenities, developers and municipalities can leverage the collective investment they would have to make anyway to achieve a whole that is truly greater than the sum of its parts.

The diverse movements in planning, design and engineering that are integrated in this report have been developed by people all over the country over the last twenty years. For example, smart growth has emerged as a common theme in regional planning, largely in response to the inefficiencies and excesses of suburban sprawl. In architecture, the principles of New Urbanism show how to rebuild urban neighborhoods and redevelop suburbs to



Overcoming the complex environmental, social, and permitting issues surrounding the redevelopment of urban sites requires creative design and new approaches to stormwater management.

be more livable and pedestrian-friendly. In environmental planning, Sustainable Design is the watchword, focusing on development that uses resources more efficiently and reduces energy requirements. And in civil engineering, the design of stormwater systems has evolved from costly “end of pipe” systems to “low impact development” techniques that return stormwater to the ground close to the source and maintain existing hydrology.

Planners and professionals in each of these disciplines are beginning to think about how these techniques can be united into a comprehensive approach. This process, of which this manual is one example, is driven partly by the necessity of stretching state and municipal budgets to do more with less. It has received a considerable boost from the leadership of the US Environmental Protection Agency, which has developed an extensive program on the subject of smart growth and environmental restoration (www.epa.gov/livability).

Along with this carrot of information and outreach, EPA has a stick – the Phase II Stormwater Regulations. Growing out of 1987 amendments to the Federal Clean Water Act, Phase I of the National Pollution Discharge Elimination System (NPDES) went into effect in 1990. Phase I required NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s) in places or counties with populations over 100,000, and for construction projects that disturb more than five acres. In 1999, EPA published final rules for Storm Water Phase II. Phase II requires NPDES permits for stormwater discharges from small MS4s and construction activities that disturb between 1 and 5 acres. In practice, this means that most communities and development projects in Rhode Island are subject to the Phase II regulations.

As part of complying with the requirements of Phase II, EPA requires communities to

establish a stormwater management program. Such a program must include six minimum control measures:

1. Public education and outreach.
2. Public participation/involvement.
3. Illicit discharge detection and elimination.
4. Construction site runoff control.
5. Post construction runoff control.
6. Pollution prevention/good housekeeping.

As described in a new publication, “Protecting Water Resources with Smart Growth,” a community’s smart growth plans can help fulfill many of these minimum control measures (www.epa.gov/livability/water_resource.htm). The theme of that publication is that reducing the impact of stormwater runoff is as much a function of the overall pattern of land use and the layout of development projects as it is of specific engineering techniques to treat water “at the end of the pipe.” While it was developed independently, the Urban Environmental Design Manual illustrates how this approach works. Using real sites in urban areas, it details how a combination of smart growth master planning and creative stormwater design can overcome common environmental road blocks and planning complexities.

While the USEPA has led nationally in demonstrating the application of smart



While smart growth often points to sites with access to roads and services as the most appropriate for development, this can increase pressure on natural systems that are already stressed. Creative approaches to stormwater engineering can protect riparian corridors while adding amenities that increase the quality of life for residents.

growth principles to environmental planning and design, the citizens and public officials of Rhode Island have not been idle in pursuing progressive approaches to planning – in fact, Rhode Island has been a leader in promoting comprehensive planning and creative zoning. For example, the Governor’s Growth Planning Council, established in 2000 by an Executive Order from Governor Lincoln Almond, was charged with finding a way to balance Rhode Island’s needs for economic and residential development with those for environmental preservation (www.planning.state.ri.us/gpc/default.htm). The order noted that “continued growth of Rhode Island will dramatically

change the face of the state in the future, and the integration of economic development, environmental protection and preservation, and community needs is essential to maintain and enhance the quality of life for future generations.”

The Council’s mission includes a broad interagency effort, designed to:

- examine the economic, environmental, and social impacts of current development patterns in the state;
- inventory existing State programs, policies, and expenditures to evaluate

their effect on sustainable development and the preservation and enhancement of environmental quality and resources;

- recommend ways of encouraging growth in economically and environmentally sound locations;
- serve in an advisory capacity to local communities in the development of their land use plans;
- and recommend any changes in State and federal law or regulations.

In 2002, the Council published a report that outlines an ambitious program with a simple theme: “Growth Centers: Recommendations for Encouraging Growth and Investment in Economically and Environmentally Sound Locations in Rhode Island.” The Growth Centers concept is designed to focus planning and public investment on areas that each community identifies as the most appropriate for growth. Growth Centers are defined as “dynamic and efficient centers for development that have a core of commercial and community services, residential development, and natural and built landmarks and boundaries that provide a sense of place.” Incorporated into the State Guide Plan and the Handbook on Comprehensive Planning, the Growth Centers idea will guide planning and investment at both the local and regional level.

A major road block to implementing the Growth Centers concept is that fact that in



The Growth Centers approach is designed to help focus public and private investment in the locations where it makes the most sense. This is exemplified by Waterplace Park in Providence, the centerpiece of an extraordinary urban revival.

many urban areas where they make the most sense, the development of growth centers is hampered by issues of access and parking, decaying buildings and infrastructure, and industrial contamination. The complications of planning and permitting, combined with environmental hazards, can make it seem

easier to develop suburban greenfields than to take on urban brownfields. The purpose of this manual is to show how these road blocks can be overcome with the creative integration of planning, public participation, and environmental engineering -- turning liabilities into opportunities for economic growth and revitalization at the heart of our communities.

Project Overview

This Urban Environmental Design Manual is intended to promote environmentally responsible urban revitalization and infill development by providing guidance to local officials, the development industry, community groups and the public. This guidance is designed to identify techniques to address issues of environmental protection and sustainable development in an urban setting and to facilitate brownfields redevelopment through illustrated design scenarios and model development standards. These materials show communities how to promote sustainable economic development and enhanced quality of life while protecting the character of urban neighborhoods and revitalizing neglected areas.

As described above, the Urban Environmental Design Manual is connected with a broader statewide effort to prevent urban sprawl and to direct development towards existing villages and urban centers to protect sensitive

natural resources and to encourage sustainable development. The project was designed to develop guidance for these urban construction and renovation projects so that, to the extent possible, the development can maintain and restore the natural environment. The project had five key elements:

- Formation of a broad-based Advisory Committee to identify common issues and concerns of potential stakeholders in urban development and redevelopment projects.
- Creation of planning and design scenarios to serve as case studies illustrating recommended techniques for combining stormwater management with urban design.
- Recommended best management practices for stormwater management on urban sites.
- Model zoning ordinance language, to help communities implement the concepts illustrated in the manual.
- Development of training materials and educational workshops.

The Advisory Committee was composed of local planners, representatives of state and federal agencies and non-profit groups, and independent professionals. The committee met regularly over the course of the project to help the consultant team identify key issues to be addressed, select practices to be explored, nominate potential case study

sites and review the design scenarios and recommendations. Their first task was to list the issues that planners, developers, and reviewing agencies struggle with on a day to day basis. These included both urban design issues and environmental issues, which became the touchstones for developing case study scenarios and best management practices described in this report:

Urban Design Issues:

- Single use vs. mixed use development.
- Historic preservation and protection of neighborhoods.
- Traffic and transportation, transit-oriented design.
- Site access and parking.
- Open space protection.
- Planning for public access and recreation.
- Gentrification.
- Financing and tax strategies.
- Accommodating siting for industrial facilities.

Environmental issues:

- Planning strategies for environmental protection and restoration.
- Conservation and restoration of natural habitat and healthy riparian ecosystems.
- Controlling stormwater runoff; low impact design techniques.
- Green architecture techniques.
- Green parking lots.

- Sustainable landscaping standards.
- Preserving public health; dealing with hazardous wastes and other contamination.
- Climate and air quality issues.
- Wastewater management.

With these key issues identified, the project team worked with the Advisory Committee to identify a series of case study sites that would illustrate real-world solutions to the problems of redeveloping urban sites. In order to select sites that represented the full range of issues and types, a matrix was developed that compared each potential site against a range of types, including brownfields, greyfields, vacant/abandoned property, village, and urban neighborhood. Other criteria incorporated into the matrix included the mix of uses, historic preservation, riparian zone preservation/restoration and community support. Using the matrix, the advisory committee selected the four sites that are described in detail in Chapter 2. Located in Providence, Pawtucket, Central Falls and Burrillville, the case studies offer a broad range of problems and potential solutions:

- Revitalization of a mill complex in a rural village.
- Redevelopment of an urban mill complex.
- Restoration of a riverfront brownfield for economic development.
- Revitalization of an urban neighborhood.



The sites selected as case studies for the Urban Environmental Design Manual were chosen to represent a range of situations faced by communities across the state. They range from the Rau Fastener complex in the center of Providence (left) to the Stillwater Mill in rural Burrillville (right). They share similar complexities in terms of brown-field remediation, environmental permitting, economic development and neighborhood concerns.

As part of the four design scenarios, detailed best management practices were developed to illustrate the process of selecting and designing stormwater practices tailored to the site and the urban design goals of each project. The factors considered in the selection process include land use, physical constraints, watershed context, required capacity, pollutant removal needs, environmental benefits, and maintenance issues. As described in detail in Chapter 2, these practices illustrate how local planners and developers can select from the many options being pursued throughout the country those that will be most useful to solving specific local problems.

The final element of the Urban Environmental Design Project was model zoning language designed to bridge the gap between creative planning and design and real-world implementation of the recommended tools and techniques. Rather than providing a set of complete ordinances, these materials have been organized as a set of development standards and review criteria, which can be incorporated into local ordinances and review procedures according to the specific need of individual cities and towns. These development standards are intended to provide detailed information that communities, developers, engineers and planners can use in designing and reviewing redevelopment

projects. Standards are provided for buffers, preservation of historic resources, parking/intermodal transportation, landscaping, mixed use development, open space preservation, third party review fees, adequate public facilities, stormwater management/erosion control, enabling brownfield development, and storage of hazardous materials. These considerations were developed over the course of the project through discussions with the Design Manual Committee and represent a mix of legal, planning, aesthetic and engineering considerations. Because of the resulting length and amount detail, they are included as a stand-alone appendix to this manual.

Urban Design Issues and Redevelopment Principles

Over the course of the project, the Advisory Committee and the project team developed a list of common problems and issues in urban environmental design that served as the touchstone for the other elements of the project. These issues, ranging from selecting appropriate land uses and density of development to stormwater management, include many aspects of urban design that planners and regulators face on a daily basis. They also represent key stumbling blocks to a more sustainable approach to development that many communities have said, through their comprehensive plans, that they wish to achieve, but which is often hard to implement because of outdated regulations and development practices.

These issues were one factor in selecting the case study sites, and were returned to again and again as design alternatives were evaluated. In each case, specific solutions to these general issues were developed for each site that reflected its unique problems and opportunities. By looking at the case studies as a whole, however, certain common principles emerged that can serve as a general guide to development and redevelopment of urban sites. The following principles start with recommendations for land use and design and conclude with principles for stormwater management and environmental engineering:

1. Mixed-Use Development: **Provide a mix of residential, commercial, and business uses wherever possible.**

Urban neighborhoods and downtowns with long-term success almost always include a flexible mix of land uses and available spaces that can adapt to changing market demands. Often this means changing regulations to promote mixed-use development. It also means encouraging the concept of flexible design of buildings that allows for many different kinds of tenants over the lifetime of a structure. This is the opposite of recent trends in strip commercial architecture, which is driven by corporate chains, each of which has a standard building design which often needs to be torn down to accommodate a change in use or tenants.

2. Contextual Design: **Reflect the surrounding natural and cultural context in the design of each project.**

The historic pattern and density of urban neighborhoods and village centers was the result of centuries of trial and error, when limitations of energy and building techniques forced a reliance on simple, sustainable materials and technologies. By starting with the existing patterns of streets and land uses as a template for new development, designers incorporate the social and environmental benefits embedded in those patterns.

On a practical level, the historic design of streets and density of structures in the neighborhood surrounding a redevelopment site often embody the sense of place of that particular community. By building on that sense of place and maintaining the original intensity of land uses, developers can create the kind of visual character that attracts tenants and builds value in the property. Cities and towns should avoid the gradual trend towards suburbanization that can spoil the efficient functioning and visual distinctiveness of the traditional downtown.

3. Transit-Oriented Design: **Minimize the need for private automobiles and encourage the use of public transportation.**

Even small projects can incorporate planning for how users can take advantage of public transportation. This can be as simple as a bus stop or pedestrian overpass to nearby transit station, park and ride lots and van pool programs. Larger projects can work with local government to secure grants to build facilities that serve the surrounding area as well as the immediate development site. These add value to the project both directly and indirectly, by creating demand for service businesses catering to commuters.

4. Shared Site Access: **Promote shared curb cuts, driveways, and access roads by planning that includes**

multiple structures and surrounding parcels.

Many planned development projects provide for efficient access by providing a single access road and shared parking areas for multiple structures. This approach can be extended by including surrounding parcels in master planning for a redevelopment site. This allows project planners to identify opportunities to connect alleys and access roads across lot lines, reduce unnecessary curb cuts, and provide continuous pedestrian routes that encourage walking. Working together on a district or neighborhood level can make access clearer, more efficient and user friendly, while reducing the need for pavement throughout the area.

5. Flexible Parking Standards:

Provide enough parking for the proposed uses, but take into account creative strategies to reduce demand and use space efficiently.

Commercial zoning often specifies parking to meet the greatest possible demand, and treats every site as if it were a suburban shopping mall. Urban sites, however, vary tremendously in the needed amount of parking, depending on the proposed use and location and context of the site. It may make more sense to invest in amenities that encourage pedestrians and bicyclists and enhance connections to nearby transit stations than to build unnecessary

surface lots. Mixed-uses lend themselves to shared parking, with a project's residents using parking at night which during the day is filled with office workers and customers. Phased development of parking can allow new lots to be constructed to meet demand, rather than building everything at once. Provision of gravel or grass-surfaced overflow lots can also meet seasonal demand for parking while reducing impervious surface area. Finally, parking structures should be considered, where feasible, to minimize the impact of stormwater runoff.

6. Public access and Recreation:

Provide permanent public access and recreational opportunities as part of the development master plan.

Creation of continuous, publicly-accessible waterfront promenades and river greenways is a common goal for cities and towns throughout the country. Developers are starting to realize that helping to build these systems as part of a project builds market identity and helps to create something much more valuable than anything that could be done as part of a single project. Like anything else, implementation requires both carrots, in the form of planning help and public support, and sticks, such as regulatory requirements to preserve public access. Site-specific recreational amenities, such as parks, ball fields and boating centers can likewise serve both the residents of a project and the general public, supporting

concessions and recreational programming that benefits everybody.

7. Open Space Protection:

Preserve open space areas containing significant natural and cultural resources.

While the perceived short-term advantages of clearing all existing features from a site to prepare for redevelopment often win out, communities and developers are beginning to recognize the value of preserving the best features of a site and designing around them. This can preserve the value of natural areas and historic sites, not just for the general public, but as something which adds value to the new development. By starting the planning process with a careful site analysis, these features can be identified and their potential role in the project defined before they are lost. Since trees are sometimes the most significant natural feature on an urban site and adjacent city streets, they should be included in any study of open space resources. The Rhode Island Urban and Community Forest Program provides guidelines for planning and conservation of urban trees.

8. Stormwater Parks:

Leverage stormwater management improvements to build public amenities.

The investment that corporations and municipalities must make to meet the requirements of state and federal stormwater

regulations can easily be leveraged to build new parks and amenities that enhance the quality of life for residents and businesses. Rather than spending the money to build detention ponds sealed off behind chain link fences, coordinated planning for stormwater management, recreation sites and natural resource buffers can help create a continuous park system at the edge of every neighborhood and lining every river corridor.

9. Gentrification:

Recognize and mitigate gentrification resulting from urban redevelopment.

Redevelopment of brownfields and revitalization of urban neighborhoods can result in the displacement of affordable housing and inexpensive business space. The creation of permanent, affordable housing should be part of every redevelopment project that includes housing. Small business can be encouraged with business incubators, shared community office and meeting space, and community technology and telecommuting centers.

10. Tax Policy and Public Investment:

Leverage private investment through targeted public improvements and supportive tax policies.

Both state and municipal governments can encourage private investment with targeted public improvements. Typically including

roads, sidewalks, parking lots and parks, these projects build tangible value in neighborhoods that encourages private investment in building renovations and new construction. The Rhode Island Growth Centers Initiative provides guidelines for communities in identifying growth centers and planning for public improvements.

Local, state and federal tax policies provide an important tool for encouraging private investment in neighborhood revitalization and affordable housing. The RI Historic Preservation Tax Credits and Mill Building Rehab Tax Credits are two examples.

11. Riparian Buffers and Natural Habitat: **Preserve and restore natural habitat and healthy riparian ecosystems.**

A key objective for development and redevelopment involves the preservation and restoration of lands immediately adjacent to aquatic ecosystems. These systems are the most ecologically productive and offer the best opportunity to achieve the multiple objectives of preserving threatened and endangered species, reducing pollutant loading from urban runoff, maintaining stable stream banks, providing a corridor for species migration, and enhancing property values. Municipalities can provide a mix of regulations, guidelines and incentives for developers to maintain adequate buffers and natural areas and programs to control invasive

species once these natural areas have been retained.

12. Stormwater Management:

Control stormwater runoff close to the source with low impact development techniques

A suite of methods and techniques exist that promote the diffusion of urban runoff at the source. These include site design alternatives that help to limit impervious surfaces; stormwater measures that promote filtering and infiltration, including water quality swales, bioretention, pervious pavements, and alternative infiltration practices; stormwater storage practices that promote recycling of rainfall including cisterns and rain barrels; and alternative vegetative roofing systems that provide rooftop storage and less runoff. All of these techniques will help maintain and/or reestablish a better long-term water balance to augment and sustain groundwater supplies for drinking water and preservation of wetland resources.

13. Green Architecture:

Employ design techniques, materials, and life cycle planning that reduce energy requirements and promote sustainability.

A variety of green building methods and operational considerations are now available to create more sustainable development and redevelopment projects. These include: green

roof technologies, recycled building materials, energy saving designs that utilize passive and active solar radiation to lower heating and cooling costs, and storage of stormwater for reuse as irrigation water, non-potable water supplies and reduction of net runoff volume.

14. Green Roads and Parking Lots:

Use materials and design standards that reduce impervious surfaces and pollutant load.

Several site design strategies exist that can help reduce the impacts from road and parking runoff, these include: narrower and shorter streets, smaller rights-of-way, smaller turn-arounds, open channel drainage design, smaller parking lots based on realistic parking demand data or shared parking, smaller parking stalls and drive aisles, use of infiltration practices for smaller drainage areas, and/or the use of permeable pavers for overflow parking areas. Collectively, these practices result in less runoff and reduced pollutant load delivery to receiving waters.

15. Sustainable Landscaping Standards:

Promote use of species and planting techniques that reduce need for irrigation and support long-term sustainability.

There is a basic approach, known as ecological landscaping, that promotes native species over non-native species, especially those that are more drought tolerant, require fewer pesticides

and fertilizers and increase erosion protection. This approach replaces traditional turfgrass with a landscape of native trees, shrubs, and perennials that require less maintenance and less irrigation while providing wildlife habitat for birds, butterflies, and small mammals. The RI Wild Plant Society and URI's Greenshare Program provide information on sustainable landscapes.

16. Environmental Site Assessment:

Conduct an assessment of site constraints and opportunities at the outset of the redevelopment planning process::

Many older urban areas and land uses have contributed some level of contamination to soils and groundwater. Municipalities can require urban redevelopment projects to include a provision to conduct an environmental site assessment that identifies the basic site history, and maps existing resource constraints (floodplains, wetlands, streams, springs, natural area remnants, etc.). Where past site history suggests possible contamination, soil and groundwater testing is warranted.

17. Climate and Air Quality:

Avoid materials and planning patterns that contribute to global warming, while encouraging techniques that provide natural cooling and air filtration as part of the project.

Redevelopment and infill projects can either contribute to the status quo, or incorporate design measures that contribute to a cumulative benefit in climate and air quality. Projects that incorporate green roofs, recycled materials, intermodal transportation design, permeable pavers, and similar elements will help reduce urban heat island effects, automobile induced air quality impacts and pollutant loading delivery to receiving waters.

18. Wastewater Management:

Use planning and investment in wastewater systems to add value to urban neighborhoods and discourage suburban sprawl into sensitive areas.

Wastewater infrastructure capacity is a scarce public resource, and a key determinant of growth. Guided by local Comprehensive Plans, the benefit of public investment should be maximized by ensuring appropriate density in serviced areas, while discouraging growth in unserviced areas. Reliance on individual wastewater systems can overburden coastal waters with nutrient loading and/or contaminate swimming and shellfish resource areas with bacteria. At the same time, communities need to balance effective wastewater treatment with maintenance of groundwater levels to preserve wetland resources and drinking water supplies. Municipalities on centralized sewer systems may need to augment groundwater recharge where wastewater is piped outside of a particular basin.